National Semiconductor

April 2007

LM748
Operational Amplifier

General Description

The LM48 is a general purpose operational amplifier with external frequency compensation.

The unity-gain compensation specified makes the circuit stable for all feedback configurations, even with capacitive loads. It is possible to optimize compensation for best high frequency performance at any gain. As a comparator, the output can be clamped at any desired level to make it compatible with logic circuits.

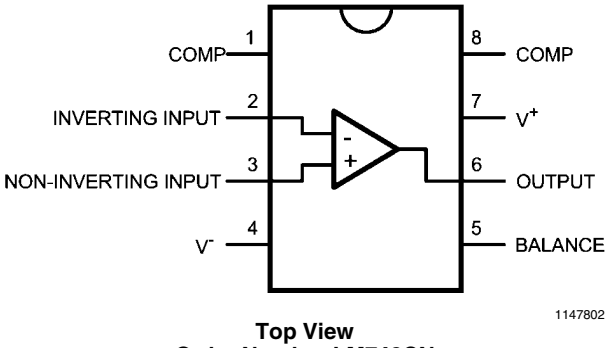
The LM748C is specified for operation over the 0°C to +70°C temperature range.

Features

- Frequency compensation with a single 30 pF capacitor
- Operation from ±5V to ±20V
- Continuous short-circuit protection
- Operation as a comparator with differential inputs as high as ±30V
- No latch-up when common range is exceeded
- Same pin configuration as the LM101

Connection Diagram

Dual-In-Line Package



Top View
Order Number LM748CN
See NS Package Number N08B

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/ Distributors for availability and specifications.

Supply Voltage	±22V
Power Dissipation (Note 2)	500 mW
Differential Input Voltage	±30V
Input Voltage (Note 3)	±15V
Output Short-Circuit Duration (Note 4)	
Operating Temperature Range: LM748C	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	+300°C

Electrical Characteristics (Note 5)

Parameter	Conditions	Min	Typ	Max	Units
Input Offset Voltage	T_A = 25°C, $R_S \leq$ 10 kΩ		1.0	5.0	mV
Input Offset Current	T_A = 25°C		40	200	nA
Input Bias Current	T_A = 25°C		120	500	nA
Input Resistance	T_A = 25°C	300	800		kΩ
Supply Current	T_A = 25°C, V_S = ± 15V		1.8	2.8	mA
Large Signal Voltage Gain	T_A = 25°C, V_S = ± 15V V_{OUT} = ± 10V, $R_L \geq$ 2 kΩ	50	160		V/mV
Input Offset Voltage	$R_S \leq$ 10 kΩ			6.0	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S \leq$ 50Ω		3.0		µV/°C
	$R_S \leq$ 10 kΩ		6.0		µV/°C
Input Offset Current	T_A = 0°C to +70°C			300	nA
	T_A = −55°C to +125°C			500	nA
Input Bias Current	T_A = 0°C to +70°C			0.8	µA
	T_A = −55°C to +125°C			1.5	µA
Supply Current	T_A = +125°C, V_S = ± 15V		1.2	2.25	mA
	T_A = −55°C to +125°C		1.9	3.3	mA
Large Signal Voltage Gain	V_S = ± 15V, V_{OUT} = ± 10V $R_L \geq$ 2 kΩ	25			V/mV
Output Voltage Swing	V_S = ± 15V, R_L = 10 kΩ	±12	±14		V
	V_S = ± 15V, R_L = 2 kΩ	±10	±13		V
Input Voltage Range	V_S = ± 15V	±12			V
Common-Mode Rejection Ratio	$R_S \leq$ 10 kΩ	70	90		dB
Supply Voltage Rejection Mode	$R_S \leq$ 10 kΩ	77	90		dB

Note 1: Absolute maximum ratings indicate limits beyond which damage to the device may occur. Electrical characteristic specifications do not apply when operating the device outside of its rated operating conditions.

Note 2: For operating at elevated temperatures, the device must be derated based on a maximum junction to case thermal resistance of 45°C per watt, or 150° C per watt junction to ambient. (See Curves).

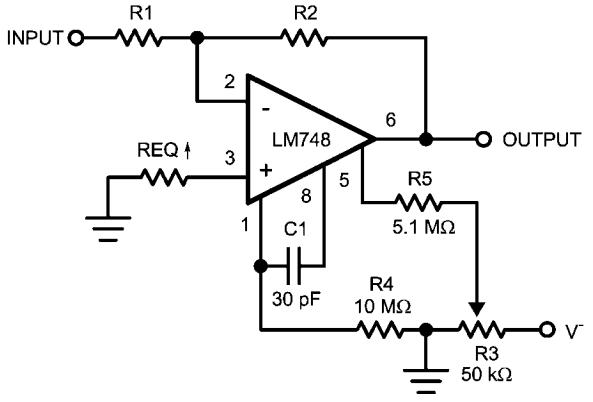
Note 3: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

Note 4: Continuous short circuit is allowed for case temperatures to +125°C and ambient temperatures to +70°C.

Note 5: These specifications apply for ±5V $\leq V_S \leq$ +15V and 0°C $\leq T_A \leq$ +70°C, unless otherwise specified.

Typical Applications

Inverting Amplifier with Balancing Circuit



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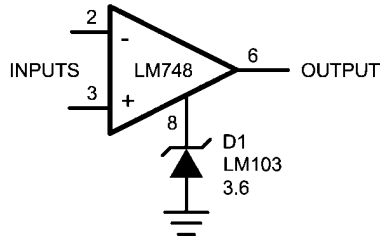
†May be zero or equal to parallel combination of R1 and R2 for minimum offset.

Voltage Comparable for Driving DTL or TTL Integrated Circuits



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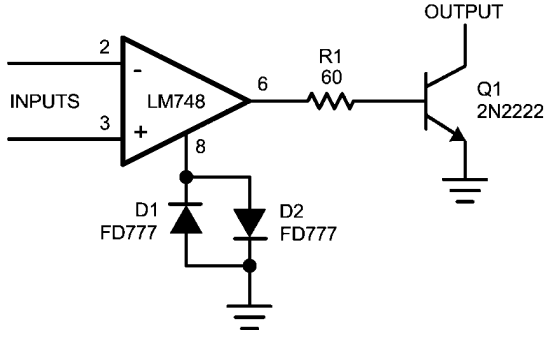
Voltage Comparable for Driving RTL Logic or High Current Driver



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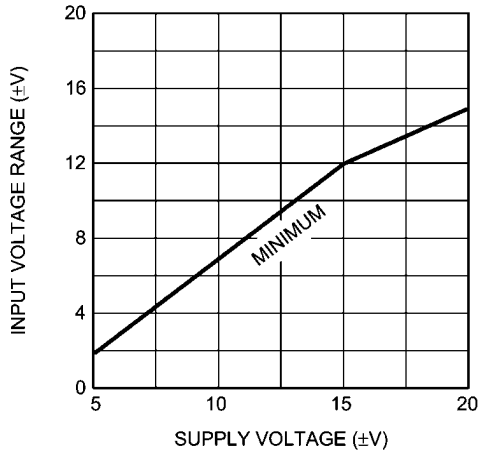
Guaranteed Performance Characteristics (Note 5)

Input Voltage Range



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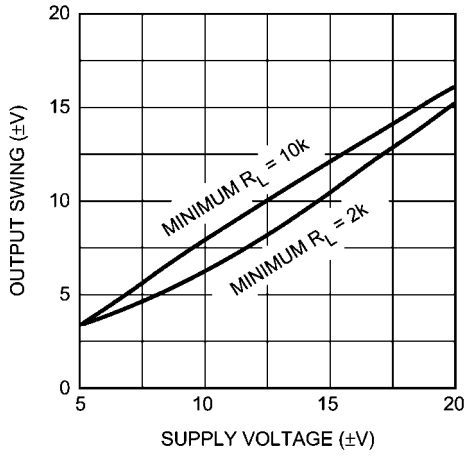
Output Swing



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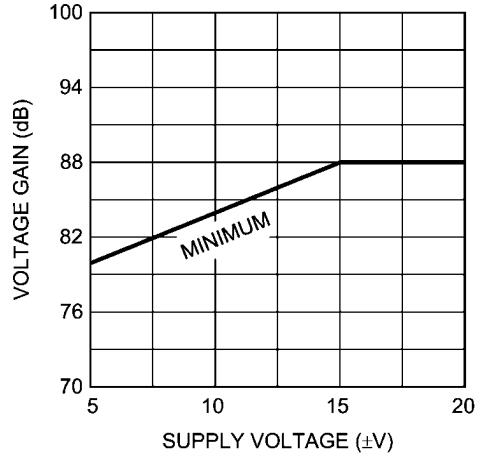
Voltage Gain



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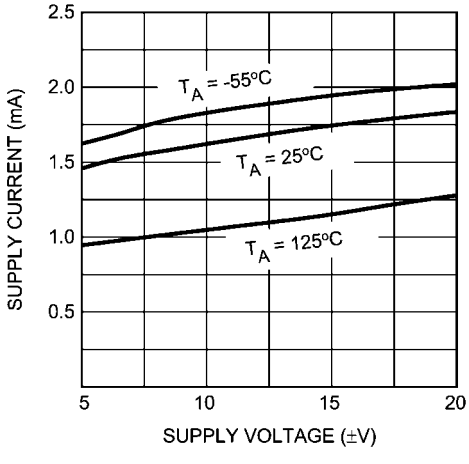
Supply Current



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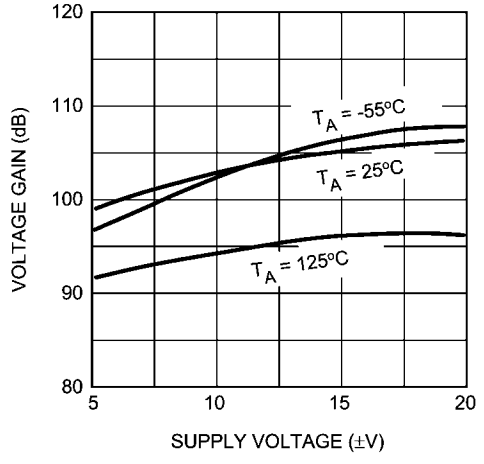
Voltage Gain



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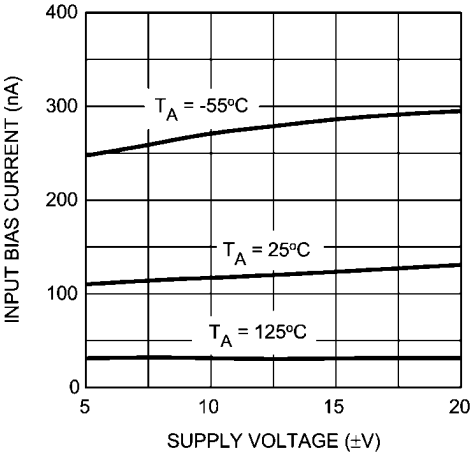
Input Bias Current



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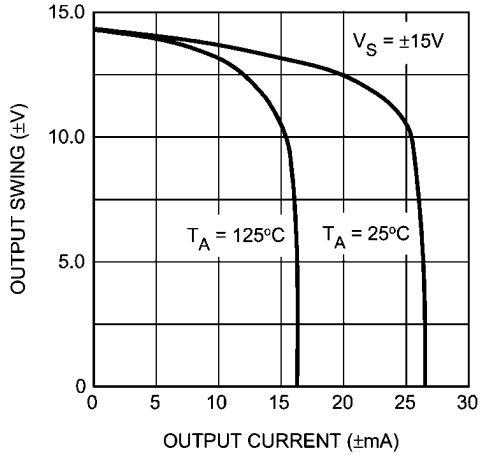
Current Limiting



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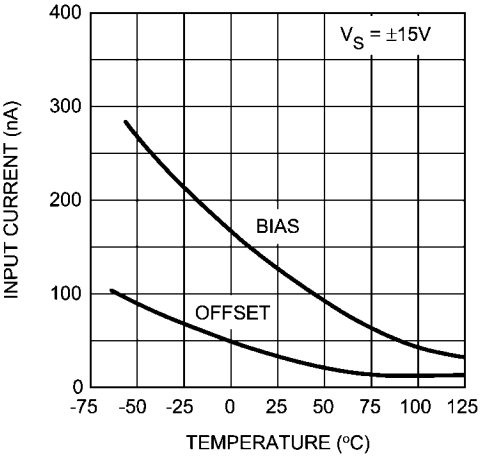
Input Current



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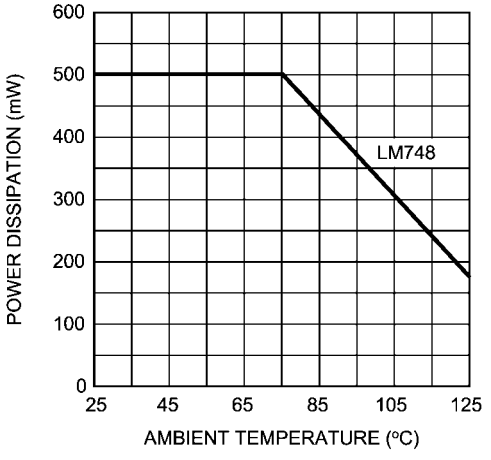
Maximum Power Dissipation



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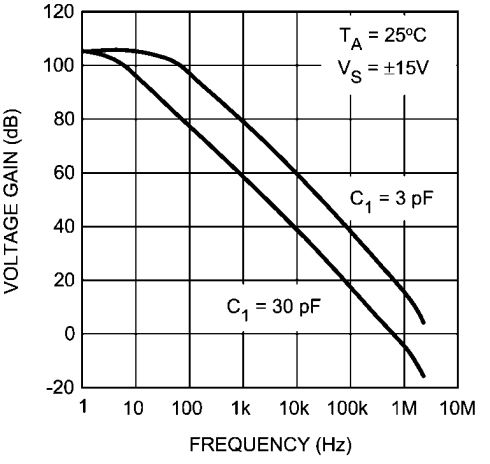
Open Loop Frequency Response



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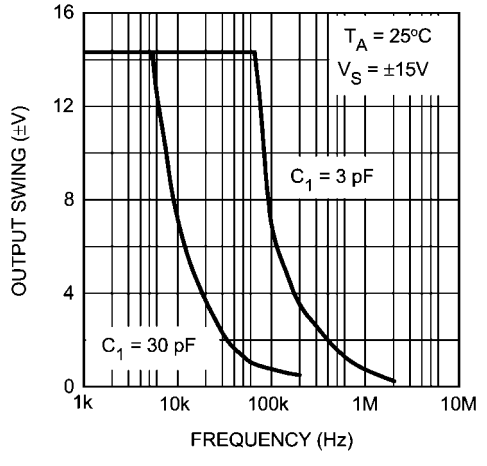
Large Signal Frequency Response



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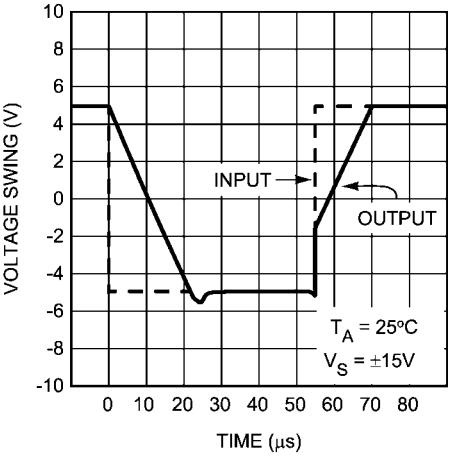
Voltage Follower Pulse Response



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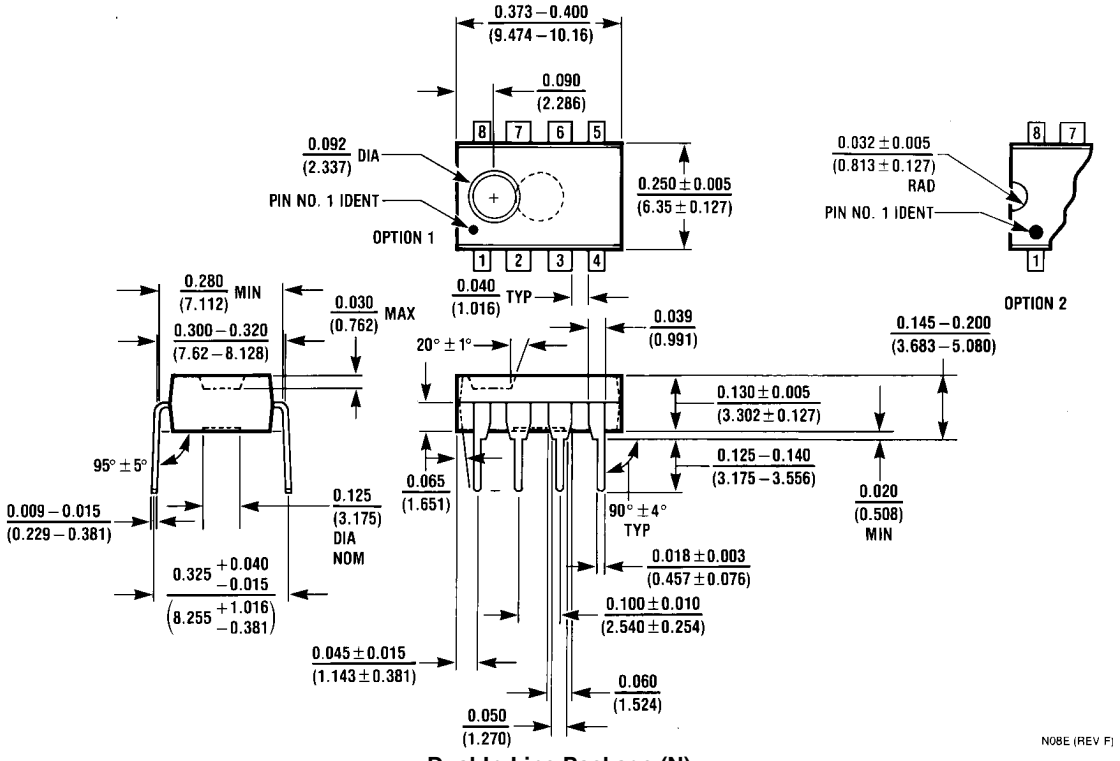
Physical Dimensions inches (millimeters) unless otherwise noted



Dual-In-Line Package (N)
Order Number LM748CN
NS Package Number N08E

Notes

Notes

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